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Status of the genera *Hymenangium* and *Descomyces*

Neale L. Bougher

neale.bougher@dec.wa.gov.au
Department of Environment and Conservation, Western Australian Herbarium
Locked Bag 104, Bentley Delivery Centre, WA 6983, Australia

Abstract — Uncertainty in contemporary literature concerning the status of *Hymenangium* and *Descomyces* is addressed. Typification of *Hymenangium* and the nomenclatural confusion regarding *H. album* are clarified. Suggestions in the current Dictionary of Fungi that *Descomyces* be conserved against *Hymenangium* are discounted, and the author proposes that the entry for *Hymenangium* ("*Hymenangium* Klotzsch (1839) = *Descomyces*") be corrected to "*Hymenangium* Klotzsch (1838) = *Rhizopogon,*" to reflect Klotzsch's erection of *Hymenangium* for a *Rhizopogon* species (*H. virens*). In 1839 Klotzsch cited a J.D. Hooker specimen as a second species of *Hymenangium*, but misapplied *Tuber album* Bull. to serve as a reference for its name *Hymenangium album*. For *Descomyces,* the epithet *albus* should not be ascribed to Klotzsch but rather to Berkeley, who described *Hymenogaster albus* in 1844 based on the same Hooker collection annotated by Klotzsch. As Berkeley delimited the original type by excluding all other elements ('exclusis omnibus synonymis'), under Art. 48.1 he established a valid new species for which *Descomyces albus* (Berk.) Bougher & Castellano should be regarded as the correct name. Conservation of the later-named *Rhizopogonaceae* against *Hymenangiaceae* may be needed.

Key words—*Agaricales*, *Cortinariaceae*, taxonomy

Introduction

The genus *Descomyces* was proposed by Bougher & Castellano (1993) to accommodate gastroid fungi with morphologies (peridium, veil, spore, and mycorrhiza) matching those of the agaricoid genus *Descolea* and the secotioid genus *Setchelliogaster*. Phylogenetic analyses of molecular sequences have supported the proposition of a *Descolea-Setchelliogaster-Descomyces* complex (Peintner et al. 2001).

Bougher & Castellano (1993) transferred three species from the genus *Hymenogaster* into *Descomyces* and nominated "*Descomyces albus* (Klotzsch) Bougher & Castellano" as the type species. Four additional species of *Descomyces* have been published (Giachini et al. 2000, Francis & Bougher 2004, Nouhra et al. 2008). However, the genus name *Descomyces* has not gained universal

acceptance in the contemporary literature due to doubts concerning the status of the type species *Descomyces albus* and particularly its supposed basionym "*Hymenangium album* Klotzsch." Some authors have adopted *Hymenangium* in preference to *Descomyces*, e.g. Legon & Henrici (2005), Pegler et al. (1993), and Roberts (2000). Such authors presumably accept that *Hymenangium album* as proposed by Klotzsch (1839) is the valid type species of *Hymenangium* and that therefore the generic name *Descomyces* is nomenclaturally superfluous. Some other authors (e.g. Montecchi & Sarasini 2000) have stated a desire for further clarification about the correct genus name and have avoided using either name by referring to *Hymenangium album/ Descomyces albus* as "*Hymenogaster albus* (Klotzsch) Berk."

Martín (1999) examined the status of *Hymenangium album* and proposed that this name and its basionym "*Rhizopogon albus* Fr." do indeed refer to *Descomyces albus*. However, several aspects of Martín's conclusions are incorrect with regard to the ICBN. Martín (1999) also did not address the issue of whether *Hymenangium album* validly can be accepted as a basis to typify *Hymenangium* or *Descomyces*. Bougher & Castellano (1993) had previously argued that *Hymenangium album* cannot be accepted as the type species for *Hymenangium* because *Hymenangium* Klotzsch 1838 is typified by *H. virens* (Alb. & Schwein.) Klotzsch (basionym *Tuber virens* Alb. & Schwein.). However, that conclusion has been overlooked by all mycologists, including in the most recent Dictionary of Fungi (Kirk et al. 2008). The dictionary entry for *Descomyces* includes: "*Descomyces* is not yet conserved against *Hymenangium*." The entry for *Hymenangium* is: "*Hymenangium* Klotzsch (1839) = *Descomyces*. *Descomyces* is not yet conserved against *Hymenangium*, fide Kuyper (in litt.)." This current paper addresses issues concerning the typification of *Hymenangium* in order to clarify the status of that genus and to determine if indeed it is necessary to conserve the genus *Descomyces*.

Taxonomy

In 1838, F. Klotzsch proposed *Hymenangium* as a new monotypic genus based on *Tuber virens* (Klotzsch 1838). The generic description and Klotzsch's illustration of *Hymenangium virens* Klotzsch depict a fungus with quadrisporic basidia. Klotzsch (1838) listed the following taxonomic synonyms under *Hymenangium virens*: (a) "*Tuber virens* Albertini et Schweinitz;" (b) "*Rhizopogon virens* Fries;" (c) "*Tuber album* Albertini et Schweinitz." Klotzsch did not accept Albertini & Schweinitz's *T. album* as a species distinct from *Tuber virens*. Based on recombinations by Fries (1823), later authors accepted Albertini & Schweinitz's *Tuber album* under *Rhizopogon*. Saccardo (1888) designated Albertini & Schweinitz's *Tuber album* and Klotzsch's *Hymenangium virens* under *Rhizopogon rubescens* (Tul. & C. Tul.) Tul. & C. Tul.

and placed Albertini & Schweinitz's *Tuber virens* and *Rhizopogon virens* under *Rhizopogon luteolus* Fr. There is, in my opinion, no doubt that *T. virens* refers to a species of *Rhizopogon*. Therefore *Hymenangium* becomes a taxonomic synonym of *Rhizopogon*. The entry in the DICTIONARY needs correction. Note that this conclusion also implies that the family name *Hymenangiaceae* (Corda 1842) now becomes an (older) name for *Rhizopogonaceae* (Gäumann & Dodge 1928) so conservation could be necessary. It needs to be noted that Bougher & Castellano (1993: 275) erroneously listed *Hymenangium* as a taxonomic synonym of *Hymenogaster*, which contradicted their recognition (p. 285) that *Hymenangium* as typified by *H. virens* represents *Rhizopogon*.

A year after first proposing *Hymenangium* for *H. virens*, Klotzsch (1839) emended the generic description to accommodate a second fungus — *Hymenangium album*, for which he listed the synonyms (a) "*Rhizopogon albus* Fries (excl. Albertini et Schweinitz syn.);" (b) "*Lycoperdon gibbosum* Dickson;" (c) "*Tuber album* Bulliard." As noted by Saccardo (1888), this second *Hymenangium* species is not the same fungus as Albertini & Schweinitz's *Tuber album* previously listed by Klotzsch (1838) as a synonym of *H. virens*. Rather, according to Martín (1999), it represents *Tuber album* Bull. (Bulliard 1791), part of which she refers to *Tuber borchii* Vittad. and part possibly to a *Balsamia* species. The name *Tuber album* actually dates from Bulliard (1789), who published it in the caption of his illustration of the taxon.

Klotzsch's emended generic description of *Hymenangium* includes descriptors applicable to both *H. virens* and *H. album,* e.g., by accommodating fungi having quadrisporic and bisporic basidia respectively (Klotzsch 1839). Soon after, Corda (1842) proposed the new family *Hymenangiaceae,* re-affirming in the process that Klotzsch's *Hymenangium* included quadrisporic and bisporic fungi and that Klotzsch first circumscribed the genus in 1838 in Flora Regni Borussici (6: 382).

It is clear that Klotzsch (1839) intended not to describe a new species but to apply the name of an existing species (Bulliard's *Tuber album*) to his concept. Technically, therefore, there is no "*Hymenangium album* Klotzsch" – even though the name consistently appears in the literature listing Klotzsch as basionym author instead of the correct *H. album* (Bull.) Klotzsch. Furthermore, his 1839 description leaves no doubt that Klotzsch misapplied the original Bulliardian name. This raises the question as to which taxon Klotzsch actually examined. Klotzsch cited two collections, both from the Berlin vicinity — his own found growing near *Calluna vulgaris* and *Pyrola* and another from the Berlin Botanical Garden. Klotzsch's text might suggest that he found his fungus in a heathland ("between *Calluna vulgaris*") except that the mention of *Pyrola* (a partial mycoheterotrophic plant that derives carbon from ectomycorrhizal connections) implies the presence of ectomycorrhizal trees (most likely *Pinus*)

in the vicinity. Unfortunately, neither Berlin collection survives. Nonetheless, because *Descomyces albus* is an exclusive associate of *Myrtaceae* (particularly *Eucalyptus*), it is likely that Klotzsch's own collection represents not *Descomyces* but a species of *Rhizopogon*. The identity of the specimen found in the Botanical Garden remains unknown.

In his description of *H. album,* Klotzsch (1839) also cited (with an exclamation mark) a description by Berkeley (1836: 229). This collection was made in a greenhouse in Glasgow in 1830 by Joseph Dalton Hooker (son of W.J. Hooker, then Regius Professor of Botany in Glasgow). Klotzsch annotated the Hooker collection, which is still held at Kew, where he worked between 1830 and 1832. This specimen undoubtedly represents the species now referred to *Descomyces albus*, as supported by the accurate descriptive details provided by Berkeley (1836) of the Glasgow collection that Berkeley later (1844) cited when describing *Hymenogaster albus*. It should be noted that Bougher & Castellano (1993) incorrectly listed "*Hymenogaster albus* (Klotzsch) Berk. & Br." instead of "*Hymenogaster albus* (Klotzsch) Berk." in their synonymy for *Descomyces albus*. It now seems certain that the Glasgow collection held at Kew matches Klotzsch's 1839 illustrations of the *H. album* fruit body, basidia and spores and was the specimen seen and annotated by Klotzsch (Pegler et al. 1993).

Klotzsch did not introduce a new species but rather misapplied Bulliard's name *Tuber album* to the collection he examined. There is therefore no basis for citing Klotzsch as an author of *Hymenangium album, Hymenogaster albus,* or *Descomyces albus*. Furthermore, if *Descomyces* were to be typified by *Hymenangium album* "Klotzsch," the name *Descomyces* could not be maintained.

Bougher & Castellano (1993) typified *Descomyces* by Hooker's Glasgow collection, then labeled as *Hymenogaster klotzschii* Tul. & C. Tul. 1851. *Hymenogaster klotzschii,* however, represents an illegitimate superfluous name for a species already named by Berkeley. Berkeley (1836), who initially named the species *Rhizopogon albus* based on his own observations, later referred it to *Hymenogaster albus* based on the Hooker collection at Kew (Berkeley 1844). As Berkeley (1844) explicitly excluded all other elements including the original type by his statement 'exclusis omnibus synonymis,' under Art. 48.1 his name is considered valid for a new species. For this reason, *Hymenogaster albus* Berk. (rather than the more commonly cited "*Hymenogaster albus* (Klotzsch) Berk.") serves as basionym for *Descomyces albus* (Berk.) Bougher & Castellano, the type of *Descomyces*.

Taxonomic and nomenclatural conclusions

There is no need to conserve *Descomyces* against *Hymenangium*. *Hymenangium virens* as presented by Klotzsch (1838) is the type species for *Hymenangium*.

Both it and the synonyms Klotzsch (1838) listed — "*Tuber virens* Albertini et Schweinitz," "*Rhizopogon virens* Fries," "*Tuber album* Albertini et Schweinitz" — represent species of *Rhizopogon*. Accordingly, *Hymenangium* is a synonym of the earlier-named (by E. Fries in 1817) genus *Rhizopogon*. The current entry for *Hymenangium* in Kirk et al. (2008) — "*Hymenangium* Klotzsch (1839) = *Descomyces*" — should be corrected to "*Hymenangium* Klotzsch (1838) = *Rhizopogon*." Conservation of the later named *Rhizopogonaceae* against the earlier named *Hymenangiaceae* might be needed, however.

The '*Hymenangium album*' specimen (Hooker's collection from Glasgow) examined by Klotzsch was available to be selected by Bougher & Castellano (1993) to serve as type species of the genus *Descomyces* with the valid name *Hymenogaster albus* Berk. as basionym based on Berkeley's 1844 description; Klotzsch's name *'Hymenangium album,'* however, is a misapplication to be ignored. The correct author citation under *Descomyces* is, therefore, *D. albus* (Berk.) Bougher & Castellano.

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